REMARKS

This amendment is in response to the Examiner's Office Action dated 4/11/2005. Reconsideration of this application is respectfully requested in view of the foregoing amendment and the remarks that follow.

STATUS OF CLAIMS

Claims 1-3 and 5-28 are pending.

Claims 1-3 and 5-22 are withdrawn from consideration.

Claims 23, 24, 26 and 27 stand rejected under 35 U.S.C. § 102(c) as being anticipated by Lim (USP 6430223).

Claims 25 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lim in view of Applicants' Admitted Prior Art (AAPA).

OVERVIEW OF CLAIMED INVENTION

The present invention provides for a moving pictures encoding method for encoding a picture frame of an input signal by predicting from both forward and backward picture frames, wherein the picture frame has top and bottom fields which respectively include odd and even numbers of pixel scanning lines of the picture frame. In one embodiment, the present invention's method comprises the steps of first predicting, in a macro-block unit composed of (n x n) pixels, the top field of the picture frame from either one of top and bottom fields of only the forward picture frame, and predicting the bottom field of the picture frame from either one of top and bottom fields of only the backward picture frame; generating a predictive picture according to the prediction; and encoding the picture frame of the input signal by using the generated predictive picture.

The present invention also teaches a moving picture encoding apparatus, in which a picture frame of an input signal is encoded by predicting from both forward and backward picture frames, wherein the picture frame has top and bottom fields which respectively include odd numbers and even numbers of pixel scanning lines of the picture frame. In one embodiment, the present invention's apparatus comprises a field motion vector detecting means for performing first predicting in a macro-block unit composed of (n x n) pixels, the top field of the picture frame from either one of top and bottom fields of only the forward picture frame, and the bottom field of the picture frame from either one of top and bottom fields of only the backward picture frame; a motion compensating means for generating a predictive picture according to the prediction; and an encoding means for encoding the picture frame of an input signal using the generated predictive picture.

In the Claims

Applicants have made the requested change of the examiner to claim 26 and believe the objection should be overcome.

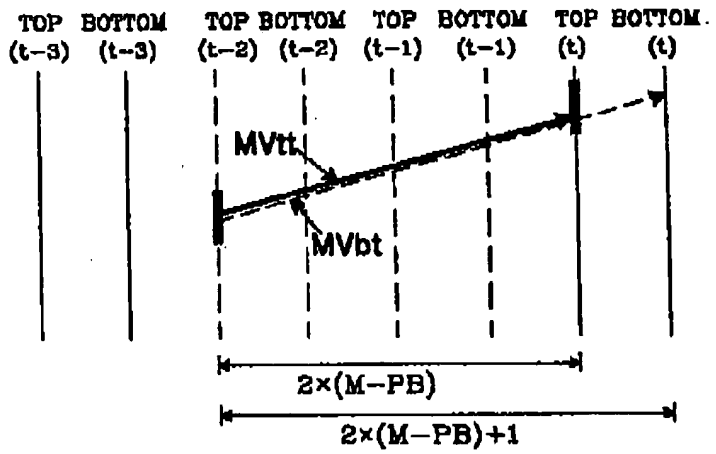
REJECTIONS UNDER 35 U.S.C. § 102

Claims 23, 24, 26 and 27 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Lim (USP 6,430,223). To be properly rejected under 35 U.S.C. §102(a), each and every element of the claims must be disclosed in a single cited reference. Applicants contend that the Lim reference fails to provide for many of the limitations of pending claims 23-28.

The examiner on page 3 of the office action refers to figures 9c and 10b of the Lim reference as anticipating many of the limitations of rejected claims 23, 24, 26, and 27. Specifically, the examiner cites figures 9c and 10b as anticipating the limitations of predicting "the top field of the picture frame from either one of top and fields of only the forward picture frame" and predicting "the bottom field of the picture frame from either one of top and bottom fields of only the backward picture frame". Applicants respectfully disagree with the examiner's assessment of the cited figures and contend that these limitations are neither taught nor suggested by the Lim reference.

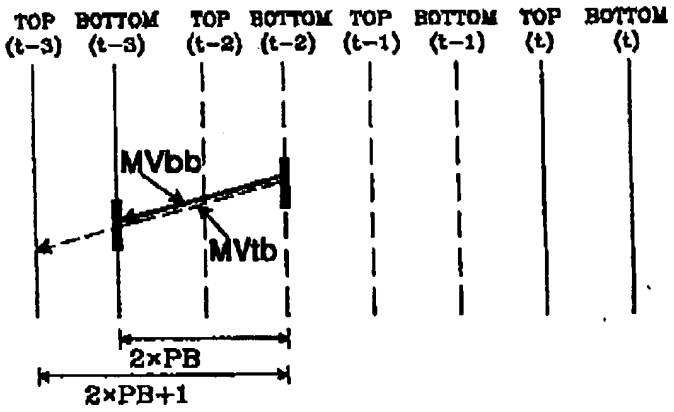
Applicants have reproduced, below, figure 9c of the Lim reference for the convenience of the examiner. As can be seen from figure 9c, the Lim reference merely teaches that both the Top(t) and Bottom(t) fields are predicted from the Top(t-2) of a forward picture frame. Applicants are unsure how the examiner interprets the prediction of both Top(t) and Bottom(t) fields from Top(t-2) of a forward picture frame to read on the limitation of predicting "the top field of the picture frame from either one of top and bottom fields of only the forward picture frame" – limitations of pending independent claims 23 and 26.

FIG.9C



Applicants have reproduced, below, figure 10b of the Lim reference for the convenience of the examiner. As can be seen from figure 10b, the Lim reference merely teaches that both the Top(t-3) and Bottom(t-3) fields are predicted from the Bottom(t-2) field of a backward picture frame. Applicants, once again, are unsure how the examiner interprets the prediction of both the Top(t-3) and Bottom(t-3) fields from the Bottom(t-3) field of a forward picture frame to read on the limitation of predicting "the bottom field of the picture frame from either one of top and bottom fields of only the backward picture frame" – limitations of pending independent claims 23 and 26.

FIG.10B



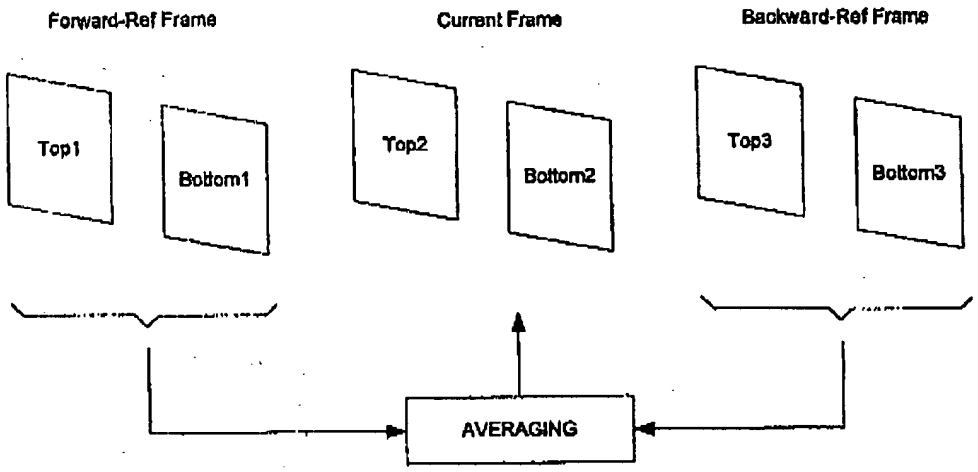
Applicants wish to note that neither figure 9c nor figure 10b suggests the features of the claimed invention such that the top field of the picture frame is predicted from either one of top and bottom fields of only the forward picture frame and the bottom field of the picture frame is predicted from either one of top and bottom fields of only the backward picture frame.

Additionally, applicants contend that the Lim reference in its entirety fails to teach or suggest prediction in both the forward and backward directions, as the motivation for Lim et al differs from that of applicants' invention.

It should be noted that only the following two scenarios have been standardized for prediction in both directions:

(1) From a current frame, a frame prediction is performed in each of the forward and backward directions in the MB unit, and predicted blocks for each of the directions are averaged to obtain a bidirectional predicted block and the original MB of the current frame is coded.

(2) From a current frame, a field prediction is performed in each of the forward and backward directions in MB unit, and predicted blocks for each of the directions is averaged to obtain a bidirectional predicted block for each field. Then, the difference between the obtained bidirectional predicted block and the original MB of each field of the current frame is calculated.



In the case of (1), the bidirectional prediction is performed by averaging blocks selected in the moving prediction of the frames formed by Top1 and Bottom1 and the frames formed by Top3 and Bottom4. In the case of (2), for each field of Top2 and Bottom2, bidirectional prediction is performed by averaging the forward prediction block of Top1 or Bottom1 and the backward prediction block of Top 3 or Bottom 3. However, in case that a scene change occurs between fields of Top2 and Bottom3, a prediction efficiency is severely deteriorated because entirely different pictures after and before the scene change are averaged because forward and backward predicted pictures are averaged in either the frame prediction or the field prediction according to the above methods of (1) and (2).

The motivation of the present invention involves preventing such deterioration. To solve the deterioration problem, the present invention proposes a bi-directional prediction mode, in which Top2 is predicted by forward directional field prediction (i.e., Top2 is predicted from Top1 or Bottom1), and Bottom2 is predicted by backward directional field prediction (i.e., Bottom2 is predicted from Top3 or Bottom3).

Contrarily, the Lim reference discloses the use (with respect to moving pictures such as MPEG-2) of the integer moving vector tool searching as used in the prior art. The examiner's respectfully directed to figure 3 (specifically, element 22) and accompanying discussion in the Lim reference, wherein Lim discloses the use of five moving vectors: Frame, Top-To-Top, Bottom-To-Top, Top-To-Bottom, and Bottom-To-Bottom. The Lim reference notes that the problem associated with the use of such moving vectors involves a large volume of calculation. Lim, accordingly, proposes that the integer moving vector searching is performed only for two moving vectors: Top-To-Top and Bottom-To-Bottom (as indicated by element 52 of figure 6). The remaining moving vectors: Frame, Bottom-To-Top, and Top-To-Bottom are obtained from the two moving vectors by performing a scale calculation in light of time distributions. The half-pixel vector calculation and determination of forward and backward predictions are processed using the obtained vectors. The motivation of Lim et al. involves the reduction in the volume of calculation. Such scale calculation of vectors is explained in figures 9a-c and figures 10a-c of the Lim reference.

Figures 3 and 6 of the Lim reference relate to one-directional prediction. Frame prediction is performed by using an original picture, a frame formed by Top2/Bottom2 in each

line, and as a reference picture, a frame formed by Top1/Bottom1 in each line. Similarly, Top-To-Top prediction is a field prediction, which uses Top2 as original and Top1 as reference, Bottom-To-Top prediction is a field prediction which uses Top2 as original and Bottom 1 as reference, Top-To-Bottom prediction is a field prediction which uses Bottom2 as original and Top1 as reference, and Bottom-To-Bottom prediction is a field prediction which uses Bottom2 as original and Bottom1 as reference.

As Lim discloses in column 9, first paragraph, MUX 64 chooses either better one of Top-To-Top or Bottom-To-Top, while MUX 66 either better one of Top-To-Bottom or Bottom-To-Bottom. This can be considered the same as conventional MPEG-2 method. Lim further discloses that frame/field determination is performed by the prediction error between the sum of prediction error (motion detection error) in two field predictions and the frame prediction.

This even vector generation of one-directional prediction is explained by Figures 9a-c for forward direction and figures 10a-c for backward direction. Lim is silent regarding how both directional prediction is processed. Applicants, therefore, contend that the motivation of Lim's invention is to reduce the moving vector calculation volume in moving picture coding such as MPEG-2, employing a conventional method such as explained in (1) and (2) (in case both directional prediction is concerned). In case of field prediction is concerned, only the above (2) is applicable.

By stark contrast, the present invention indicates (in order to accommodate the scene change) that forward field prediction is used for Top, and backward field prediction is used for

Bottom, so that the both directional prediction mode can be used, which does not average the forward and backward fields.

As mentioned above, Lim uses figures 9c and 10b to explain one directional field prediction, but fails to suggest the both directional prediction using Top-field and bottom-field without averaging both the fields.

Hence, applicants contend that the Lim reference does not teach or suggest prediction in both the forward and backward directions. Specifically, applicants contend that the Lim reference fails to teach or suggest many of the limitations of pending independent claims 23 and 26.

If the examiner still feels that such limitations of claims 23 and 26 (such as, the limitations of predicting "the top field of the picture frame from either one of top and fields of only the forward picture frame" and predicting "the bottom field of the picture frame from either one of top and bottom fields of only the backward picture frame") are disclosed in the Lim reference, applicant respectfully reminds the examiner that it is the duty of the examiner to specifically point out each and every limitation of a claim being rejected as per §1.104(c)(2) of Title 37 of the Code of Federal Regulations and section 707 of the M.P.E.P., which explicitly states that "the particular part relied on must be designated" and "the pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified".

Additionally, the above-reference arguments substantially apply to dependent claims 24-25 and 27-28, as they inherit all the limitations of the claim from which they depend. Applicants,

hence, respectfully request the examiner to withdraw the rejections with respect to the pending claims.

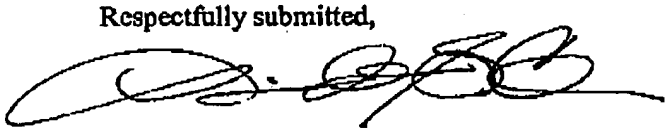
SUMMARY

As has been detailed above, none of the references, cited or applied, provide for the specific claimed details of applicants' presently claimed invention, nor renders them obvious. It is believed that this case is in condition for allowance and reconsideration thereof and early issuance is respectfully requested.

This amendment is being filed with a petition for extension of time. The Commissioner is hereby authorized to charge the petition fee, as well as any deficiencies in the fees provided to Deposit Account No. 50-1290.

If it is felt that an interview would expedite prosecution of this application, please do not hesitate to contact applicants' representative at the below number.

Respectfully submitted,



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